

Appl. No. : 09/836,674
Filed : April 16, 2001

Amendments to the Claims:

This listing of claims, in which Claims 1, 20 and 36 are amended, will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A method for growing a thin film on a surface of a substrate in a reactor according to the ALD method, said method comprising:

providing a first conduit for delivering a pulse of a first vapor phase reactant and a second conduit for delivering a pulse of a second vapor phase reactant to said reactor;

providing at least a first substrate in a pre-reaction chamber that is defined by a plurality of walls and a second substrate in a reaction chamber, said first substrate being positioned downstream of a point in the pre-reaction chamber where both said first and said second phase reactants have entered the pre-reaction chamber and said pre-reaction chamber being aligned downstream with said reaction chamber and having a single outlet that is directly connected with ~~configured such that all the reactant gas entering the pre-reaction chamber is transferred to~~ said reaction chamber, and said first substrate being a separate element from the walls of the pre-reaction chamber;

feeding the pulse of the first vapor phase reactant into said pre-reaction chamber and over the first substrate and subsequently into said reaction chamber and over the second substrate;

reacting the first vapor phase reactant with said surface of said first substrate and subsequently with a surface of said second substrate to form a thin film on said first and second substrates, wherein residual first vapor phase reactant remains in said pre-reaction chamber; and

feeding a pulse of a second vapor phase reactant into said reactor, wherein said second vapor phase reactant reacts with said residual first vapor phase reactant to form a solid reaction product in said pre-reaction chamber on said first substrate and said second vapor phase reactant subsequently reacts with said surface of said second substrate in said reaction chamber.

2. (Original) The method of Claim 1, wherein said residual first vapor phase reactant is in the gas phase.

Appl. No. : 09/836,674
Filed : April 16, 2001

3. (Previously presented) The method of Claim 1, wherein said residual first vapor phase reactant is adsorbed on the walls of the reaction chamber.

4. (Previously presented) The method of Claim 1, wherein said reaction chamber comprises a pre-reaction chamber in which the first substrate is positioned and a second reaction chamber in which the second substrate is positioned, wherein said pre-reaction chamber is upstream of said second reaction chamber.

5. (Original) The method of Claim 4, wherein said second reaction chamber is operated under conditions conducive to ALD.

6. (Canceled)

7. (Original) The method of Claim 4, wherein said residual first vapor phase reactant is present in said pre-reaction chamber.

8. (Original) The method of Claim 4, wherein said reaction product is formed in said pre-reaction chamber.

9. (Original) The method of Claim 1, further comprising repeatedly alternately feeding at least said first vapor phase reactant and said second vapor phase reactant.

10. (Canceled)

11. (Original) The method of Claim 1, further comprising feeding a plurality of vapor phase reactants into said reactor.

12. (Original) The method of Claim 1, wherein said second vapor phase reactant reacts with said residual first vapor phase reactant under conditions conducive to chemical vapor deposition.

13. (Original) The method of Claim 4, wherein said pre-reactor is placed immediately adjacent to the said second reaction chamber and it is adapted to be freely communicating with the second reaction chamber.

14-15. (Canceled)

16. (Original) The method of Claim 4, wherein said pre-reactor is operated under conditions conducive to chemical vapor deposition so as to form said solid reaction product.

17. (Previously presented) The method of Claim 4, wherein said second vapor phase reactant is reacted with the residual first vapor phase reactant to form said solid reaction product so

Appl. No. : 09/836,674
Filed : April 16, 2001

as to deplete the residual first vapor phase reactant, thereby preventing said residual first vapor phase reactant from entering said second reaction chamber.

18. (Original) The method of Claim 4, wherein the pre-reactor is operated at the same temperature as the second reactor.

19. (Canceled)

20. (Currently amended) A method for growing a thin film on a surface of a substrate in a reaction chamber comprising a plurality of walls according to the ALD method, said method comprising:

feeding a pulse of a first vapor phase reactant into said reaction chamber;

reacting the first vapor phase reactant with said surface of said substrate to form a thin film on said substrate, wherein residual first vapor phase reactant remains in said reaction chamber; and

feeding a pulse of a second vapor phase reactant into said reaction chamber,

wherein said second vapor phase reactant reacts with said residual first vapor phase reactant to form a solid reaction product in said reaction chamber; and

wherein the reaction product is deposited on a removable medium positioned upstream of said substrate and downstream of a point where both the first and second vapor phase reactants have entered the reaction chamber;

removing said removable medium from said reaction chamber, wherein said removable ~~media~~ medium is a separate element from the walls of said reaction chamber.

21. (Original) The method of Claim 4, wherein the reaction product is formed on the inner walls of the pre-reactor, and the reaction product is removed from the pre-reactor by cleaning the walls.

22. (Original) The method of Claim 4, wherein a concentration of said residual first vapor phase reactant in said pre-reactor is reduced to less than 1 ppm by reacting said residual first vapor phase reactant with said second vapor phase reactant.

23. (Original) The method of Claim 4, wherein a concentration of said residual first vapor phase reactant in said pre-reactor is reduced to a concentration of less than 1 vol-% by reacting said residual first vapor phase reactant with said second vapor phase reactant.

Appl. No. : 09/836,674
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24. (Original) The method of Claim 1, further comprising feeding an inactive gas into said reactor after feeding said first vapor phase reactant or said second vapor phase reactant.

25. (Original) The method of Claim 24, further comprising evacuating said reaction chamber while feeding said inactive gas.

26. (Original) The method of Claim 1, wherein a pressure in said reaction chamber is in the range of 1 to 100 mbar.

27-35. (Canceled)

36. (Currently amended) A method for growing a thin film on a surface of a substrate in a reaction chamber according to the ALD method, said method comprising:

feeding a pulse of a first vapor phase reactant into said reaction chamber;

reacting the first vapor phase reactant with said surface of said substrate to form a thin film on said substrate, wherein residual first vapor phase reactant remains in said reaction chamber; and

feeding a pulse of a second vapor phase reactant into said reaction chamber,

wherein said second vapor phase reactant reacts with said residual first vapor phase reactant to form a solid reaction product in said reaction chamber; and

wherein the reaction product is deposited in an independent pre-reaction chamber ~~that is configured has a single outlet that is directly connected with such that all the reactant gas entering the pre-reaction chamber is transferred to~~ said reaction chamber and said pre-reaction chamber being positioned upstream of said substrate and downstream of a point where both the first and second vapor phase reactants have entered the reaction chamber.